HOLY FAMILY UNIVERSITY

Daily Lesson Plan Template

Student: Peter Knepp Cooperating Teacher’s Approval: Date: 11/7/2012

Subject: Biology/Chemistry Topic: Process and Application of Fermentation

Grade: 10 Allocated Time: 2 hours

Student Population: Heterogeneous group of 24 adolescents with varied levels of understanding and learning styles

State Standards:

Specific Number: 3.1.10.A7 Exact Wording: Describe the relationship between the structure of organic molecules and the function they serve in living organisms. Explain how cells store and use information to guide their functions.

Specific Number: 3.1.C.A1 Exact Wording: Explain the chemistry of metabolism

Goal for Understanding: Students will learn the biological and chemical processes behind the production of beer. Students will then simulate the brewing process during a lab, producing root beer and cream soda.

Instructional Objective (Statement): Using root beer concentrate and vanilla extract, students will simulate the brewing process to build hands-on knowledge of microorganisms and anaerobic metabolism.

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| Student Behaviors   * Viewing YouTube video on the brewing process * Production of root beer or cream soda | Sources of Evidence   * Students will have made a batch of their very own root beer or cream soda | Criteria for Evaluation   * Students will complete a five question quiz regarding the biochemistry of the brewing process |

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| Estimated Time:   * 10 minutes * 5 minutes * 5 minutes * 10 minutes * 10 minutes * 5 minutes * 20 minutes * 10 minutes * 10 minutes * 5 minutes * 10 minutes * 20 minutes | Teaching to the Objective:  Intro:   * Tell me what you know about making soda. What is fermentation? Discuss where they have heard the term used previously and determine prior knowledge. Explain how fermentation relates to the process of brewing root beer.   Development:   * Explain that students will be brewing soda in groups according to a set of directions. Go over the steps and have students record them to use during group work. * Students will be introduced to the essential components of beer and the brewing process via a short YouTube video entitled: *Gordon Biersch Brewing Process* * Engage students in a discussion of the concepts presented in the video. Discuss microorganisms and anaerobic metabolism in relationship to brewing beer. Questions that have arisen as a result of the video or were not answered by the video will be answered during an open discussion. * Setup materials in stations and explain how the materials relate to those seen in the video * Divide students into pairs and go over the directions, having the students recall them in sequence. * In pairs, students will combine the ingredients of their soda, in proper proportions, to simulate the brewing process. Have students alternate reading the directions step- by-step and performing the actions of making the soda. * When they are completed, have them taste the soda and write a description of how it tastes to them and if they feel as though they were successful in brewing their root beer. * Have students clean up their work areas, discarding refuse and returning items to be reused.   Assessment:   * Review the biochemistry of the brewing process with the students. * Students will complete a short, four-question quiz to assess their understanding of the concepts covered   Closure:   * Students share the descriptions written during the lab. | Differentiation:   * Post a list of the directions on the board or project them using an LCD projector * Visual Learners: Draw a diagram that depicts the brewing process * Students who are not auditory learners can make a list of important points to aid in recall. * Teacher intervention to assist students who have difficulty performing the lab * Provide a checklist for students to follow to ensure that the area is clear and materials are returned to the proper place. * Place the steps on the board to reinforce concepts prior to quiz. Remove information for the quiz. * Create a word wall of the terminology relating to the brewing process. |

Follow-up:

Students will research the creation of a popular soda and prepare a PPT (or advertisement) presentation to share the results,

Students will be able to taste their soda at the end of the experiment, allowing a level of self-assessment

Students can write a paper about fermentation’s role throughout the history of mankind

Students will refer back to this lesson when discussing respiration and ATP production

Materials: Two gallons of spring water, sugar, root beer concentrate, vanilla extract, yeast, three liters of soda water, bottles with caps, measuring cups, measuring spoons

Resources:

* http://biology.clc.uc.edu/fankhauser/Cheese/ROOTBEER\_Jn0.htm
  + A very informational page providing a recipe and step-by-step directions for the production of root beer at home
* http://www.mccormick.com/Products/Extracts-and-Food-Colors/Extracts/Root-Beer-Concentrate.aspx
  + The recipe for root beer that is on the box of McCormick root beer concentrate. This recipe was useful in that it removed the necessity for yeast.
* http://thenewbbc.wikispaces.com/Root+Beer+Fermentation+Lab+Lesson+Plan
  + Sample lesson plan from a British classroom that presents this lesson as a full fledged lab experiment
* http://youtu.be/UpNPBso9x04
  + [Gordon Biersch Brewing Process](http://www.youtube.com/watch?v=UpNPBso9x04&feature=em-share_video_user)

Technology: Computer, Projector, Screen for PowerPoint Presentation, YouTube